What goes up must come down: ♫ volume in group fitness classes and healthy hearing

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Abstract

Group fitness classes provide an opportunity for class participants to meet their fitness goals. Good music is one reason why class participants attend a group fitness class, but there is little research that has documented music volume in a group fitness class. This mini-project collected measurements of noise levels from one fitness studio during December 2018 and January 2019.

The Occupational Safety & Health Administration (OSHA) states that levels exceeding 105 dBA for a 1-hour duration can place a person at risk for hearing damage. It is anticipated that more than half of class participants and group fitness instructors are at risk for hearing damage using OSHA standards for a 1-hour group fitness class. Additionally, it is anticipated that less than half of class participants and group fitness instructors are aware of OSHA permissible noise exposure levels and that more than half of class participants and group fitness instructors believe, "*The louder the music, the better the workout*." Lastly, when analyzing group fitness leadership styles, it is expected that less than half of group fitness instructors would modify their behavior if they understood the risk for hearing damage.

Purpose

Thousands of class participants and group fitness instructors attended group fitness classes in boutique studios and big box gyms in 2018. They may be exposed to music levels that are loud enough to cause hearing damage and they may not even know it. Class participants may already have existing hearing loss and loud music may exacerbate their existing hearing difficulties. Hearing loss has been described as a precursor to other symptoms such as tinnitus, and it has been identified as a risk factor for depression and cognitive decline. Preventative measures to protect hearing have proven effective in delaying the onset of hearing loss, and the rate at which hearing loss declines over time.

Figure 1. Drs. Kerry Mandulak, Tina Penman, and Samantha Lewis have fun riding in an indoor cycling class. Photo by Leanna René Photography.

Figure 2. Dr. Tina Penman uses a sound level meter to determine the level of music in the indoor cycling class. Photo by Leanna René Photography.

Methods

Music levels in a fitness studio in were recorded using the SoundMeter X (Faber Acoustical) mobile app on the iPhone X during December 2018 and January 2019. Approximately 50 classes were attended, however only 43 measurements were included in this dataset. The other measurements were not used due to incomplete data attributed to user error. The app was calibrated using the internal calibration in a soundproof booth. The iPhone X was placed in airplane mode and all other apps were closed. Recordings were started before the class and ended after the class. They were taken from the same position in the fitness studio within a range of 10'. Additionally, heart rate was tracked using an Apple Watch Series 2. The heart rate monitor began before class and was stopped after class.

Results

Using a 3-dB exchange rate and a criterion level of 85.0 dBA and threshold level of 80.0 dBA, time-weighted averages for the 43 measurements ranged from 85.6 dBA to 91.71 dBA. Noise dosages ranged from 114.91% to 471.82%. The noise dose exceeds the safe recommendations as established by the National Institute of Occupational Safety and Health (NIOSH). If a group fitness instructor or class participant is not wearing hearing protection, they will be at risk for hearing damage using this criteria. The use of hearing protection would reduce the likelihood of hearing damage, although the amount of reduction would vary across the type of hearing protection and proper insertion.

The model illustrating the relationship between the time-weighted average and heart rate is weak. "*The louder the music, the better the workout*" may not be necessarily true if the outcome measure is heart rate. It is likely that other factors influence the heart rate in a group fitness class. For example, being in the front row and visible to many may cause a class participant to work out harder compared to being in the back row when hidden. Other factors such as time of day, physical and mental state, presence of specific individuals, overall number of class participants, and other external factors may influence heart rate more than the level of the music.

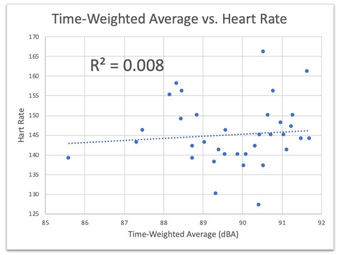

Figure 3. Time-weighted average (loudness) plotted against heart rate. Heart rate is minimally impacted by the loudness of music, at least for this model.

Leadership Approach

Figure 4. Dr. Tina Penman and fellow class participants in a group fitness indoor cycling class. Photo courtesy of SB.

What if group fitness instructors learned about the risk of hearing damage with loud music levels? Would they embrace this information and make changes as a result? Do leaders modify their behaviors if they know their decisions may cause harm to themselves or others?

The proposed analysis will explore these questions using a mixed-methods approach of integrating quantitative data (measurements of volume in group fitness classes) with qualitative data (structured interviews with class participants and group fitness instructors). It is anticipated that:

- More than half of class participants and group fitness instructors are at risk for hearing damage using OSHA standards
- Less than half of class participants and group fitness instructors are aware of OSHA permissible noise exposure levels
- More than half of class participants and group fitness instructors believe, "*The louder the music, the better the workout*"
- More than half of class participants and less than half of group fitness instructors would modify their behavior if they understood the risk for hearing damage

Additionally, this analysis will provide leadership tools for class participants and group fitness instructors, improving their hearing health in the group fitness class environment.

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